vol. II no. 7

March, 1943

School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

Can Your Students Qualify as Pilots?
by Emerson Neuthardt

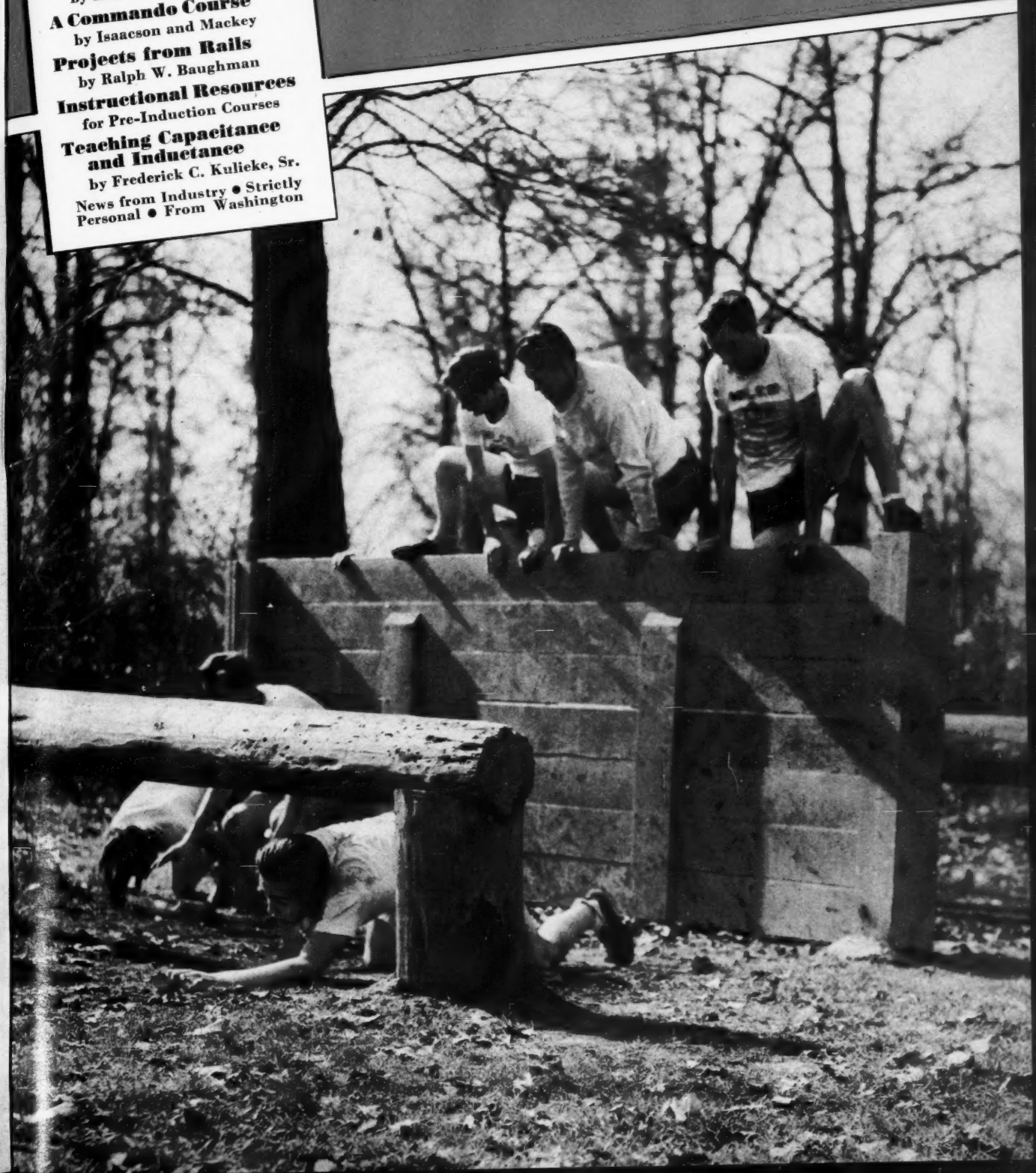
A Commando Course
by Isaacson and Mackey

Projects from Rails
by Ralph W. Baughman

Instructional Resources
for Pre-Induction Courses

Teaching Capacitance and Inductance
by Frederick C. Kulieke, Sr.

News from Industry • Strictly Personal • From Washington



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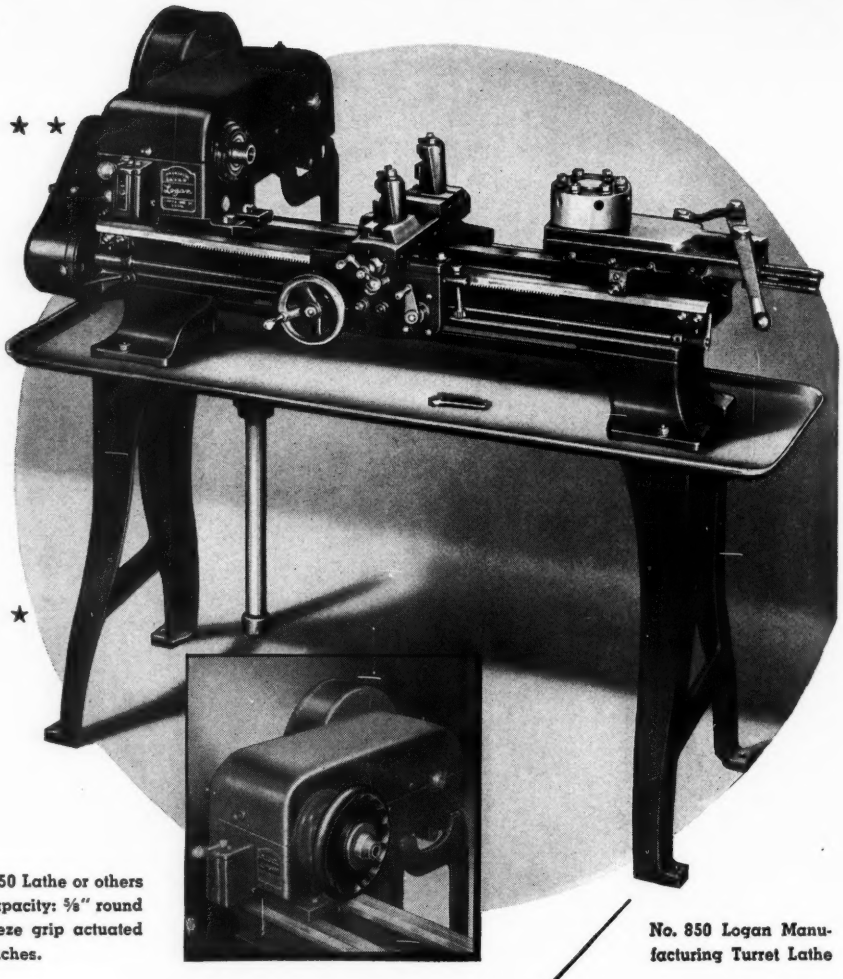

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School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

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March, 1943
Vol. II, No. 7

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School Shop is published monthly, September through June, at Ann Arbor, Michigan. Manuscripts are paid for at regular space rates and should be addressed to the Editor, School Shop, Box 100, Ann Arbor, Michigan. Subscription rates to libraries and institutions, $2.00 a year; Foreign and Canadian, $3.00 a year. 25 cents a copy. Printed in the U. S. A.

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Can Your Shop Students Qualify as Pilots?

BY *Emerson Neuthardt*

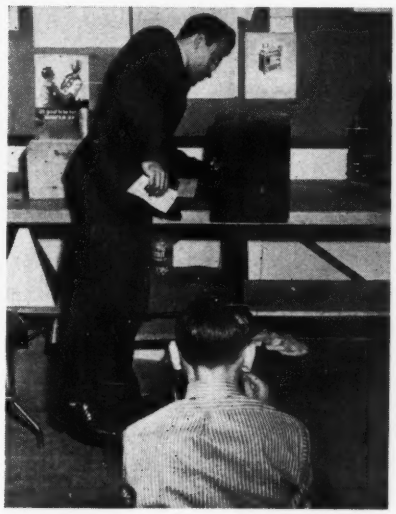
Boys everywhere are interested in finding out whether or not they can qualify as pilots. This material can be used to excellent advantage in an aviation shop course where aviation equipment is at a minimum or with an aviation club. The author teaches at Bethlehem Central School, Delmar, New York, and is co-author of "Aeronautics in the Industrial Arts Program."

VISIONS of possessing the coveted "wings" of a pilot in the Army, Navy, or Marine Corps fill the minds of many a shop student, particularly those taking pre-flight training in the high school. Interest in the program can be increased and practical guidance given by offering pilot tests in connection with the shop program so that students can find out unofficially if they are qualified for pilot training.

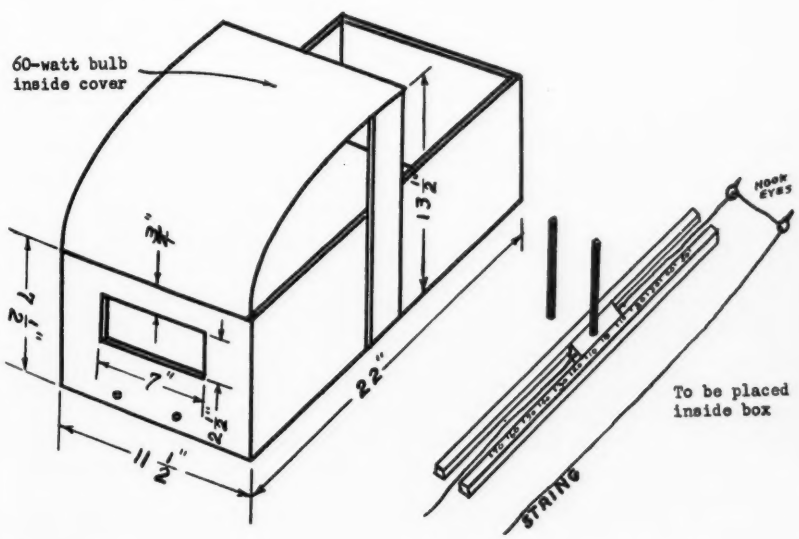
There are 10 pilot tests that are similar to those used in actual flight testing that can be given in the school shop. None of these are of long duration so it is possible to test six or eight boys in one test during a single period.

Before starting on a testing program, the instructor should make sure that he understands each test, the reason for it, how it is given, that the equipment is well prepared and at hand, and that a chart with the titles of the different tests and the name of the student to be tested is in readiness for recording the data. The composite result of these ten tests offers a good indication of whether or not a boy has some of the qualifications necessary to serve in the armed air forces, the commercial air service, or as a private pilot. The tests with a description of the procedure follow:

Depth Perception.—This is extremely important when flying, particularly when bringing the plane down. A depth perception box can be constructed similar to the plan given here to measure this ability.



The box has two dowels, one stable and one moveable forward or backward when the strings are pulled. The object of the test is to line up the two dowels so that they are opposite one another.



Equipment.—One depth-perception box; one 100-watt bulb.

Procedure.—(1) The opening of the box should be about the same height as the student's eyes when he is seated. (2) The space between the student and the front of the box should be 20 feet. (3) Have the student make four trials at lining up the rods. Record the data. If the student wears glasses, have him make four trials with them and four without. The data recorded are the numbers read on the dial, graduated in millimeters, opposite which the rods stop. (4) After the trials are completed, add the results from each trial and divide by the number of trials. In the case of those with glasses, figure the average without the glasses and with glasses separately.

Requirements.—Specifications for armed forces pilots call for an average error of less than 25 millimeters without glasses. Civilian pilot training calls for an error of not more than 30 millimeters without glasses. Commercial, private, and student pilots must average an error of not more than 30 millimeters either with or without glasses.

After completing the depth-perception test, record the data on a progression chart for the student.

Visual Acuity.—Birds, such as the hawk and eagle, are able to observe small animals along the ground when they are flying at great heights. Man has no such ability but there are certain limits within which a pilot should be able to make out objects while flying.

Equipment.—One ordinary eye-test chart similar to those used by the school

health department; a 200-watt bulb and shade; and one small 3x5 filing card.

Procedure.—(1) Place the eye-test chart on the wall approximately five feet from the floor, 20 feet from the student, and lined up with the eyes of the student with the lamp shining on it from below. (2) The instructor now holds the small card over the left eye and asks the student to read the numbers on the chart from the left margin to the right, down as far as he can make them out. The lowest line that the student can read accurately indicates his visual acuity. The process is repeated for the right eye. The instructor should observe whether or not the student is squinting as credit can only be given for the lowest line read without squinting. The fractions on the left edge of the chart show the measurements for visual acuity. If the student wears glasses, he should be tested for both eyes with and without glasses.

Requirements.—Navy, Army, and Civilian Training Program require at least a 20/20 rating in each eye without glasses. Commercial airline pilots must score a 20/50 or better rating without glasses and 20/20 with glasses for each eye. Private and student pilots must score at least 20/50 for each eye without glasses or 20/30 for each eye with glasses.

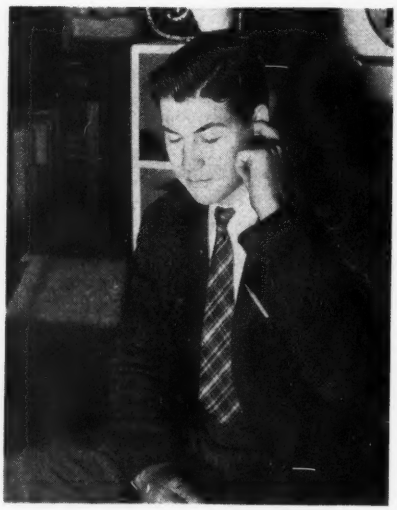
Color Vision.—Color blindness is tested because it is often necessary for a pilot to be able to distinguish whether a field is marsh, grass, heavily shrubbed, etc.

Equipment.—Color blindness charts. (These may be obtained from the school health department, a local doctor, or from C. H. Stoelting Co., Chicago, Ill.)

Procedure.—(1) Hold the color plates before the student and have him read the numbers which appear in the discs. (2) Record the answers and check against the key.

Requirements.—Armed force pilots must read all plates correctly, as must commercial pilots and civilian pilot trainees. Private and student pilots are not disqualified for failure to pass the test.

Hearing.—This is one of the most important requirements in flying. A pilot depends on hearing for such sounds as air speed, motor condition, gliding, etc.



Procedure.—(1) The student should be seated 20 feet from the instructor with his finger in his left ear and his right ear turned toward the instructor. Tell him to close his eyes and repeat out loud the numbers which he hears whispered. (2) The instructor then whispers the following numbers: 63, 88, 21, 83, 19, etc. (3) The process is repeated for the other ear.

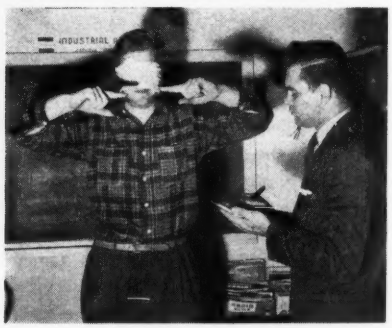
Requirements.—Armed force and civilian pilot training members should be able to hear these numbers in both ears at 20 feet. Commercial pilots must hear them at 18 feet or better. Private and student pilots must be able to hear the numbers not less than three feet from the instructor in at least one ear.

Balance.—The so-called instinct of flight depends on one's sense of balance.

Procedure.—(1) Have the student stand with his arms at his sides, then have him raise his left foot off the floor and balance on his right foot for 15 seconds. (2) Repeat using the other foot. Allow three trials for each foot.

Requirements.—All classifications of pilots must pass this test.

Muscular Coordination.—Fine neuro-muscular coordination is required in piloting a plane through action of the control stick and rudder pedals.

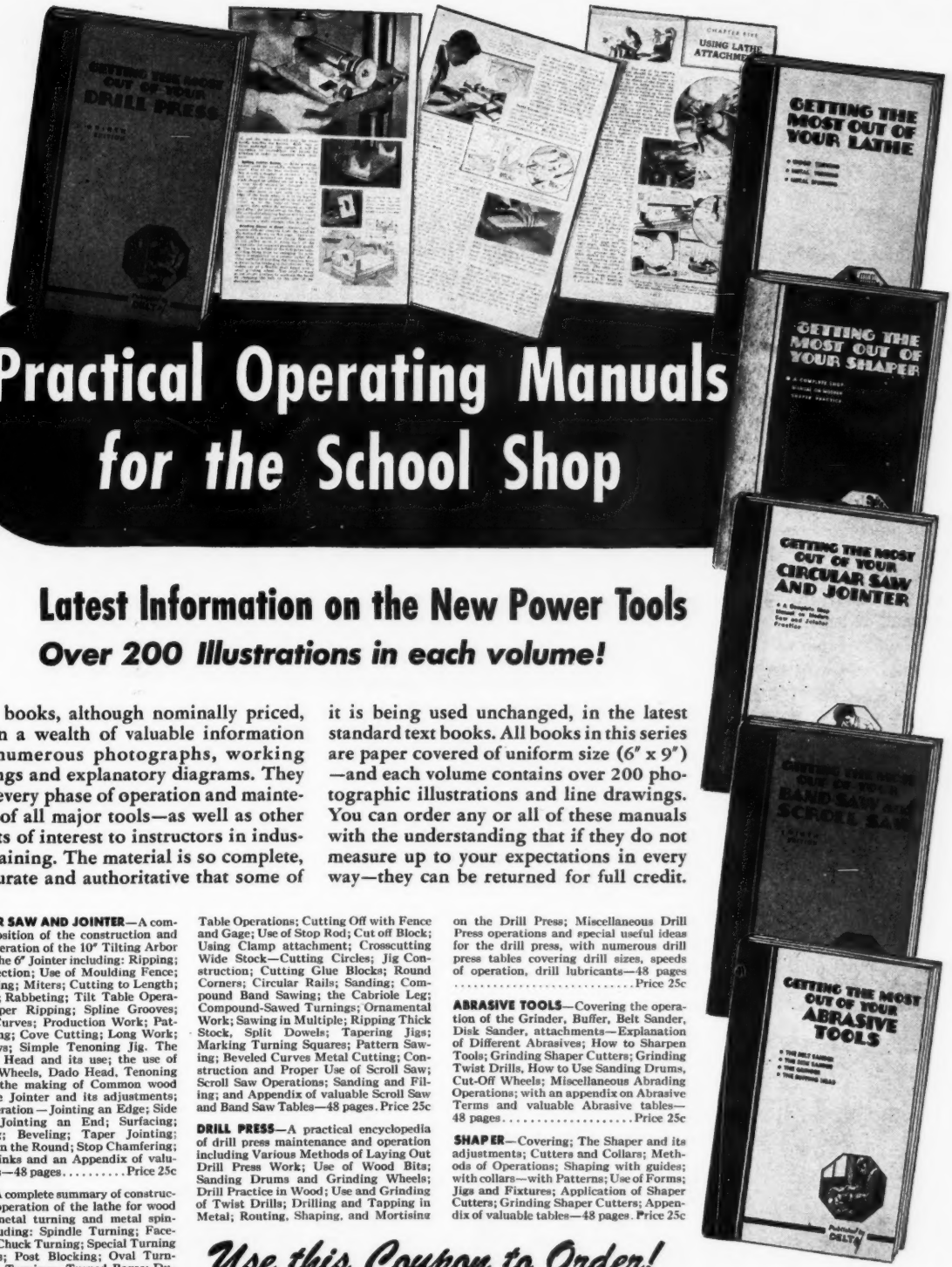


Procedure.—(1) Blindfold the student and have him stand with his hands at his sides. (2) Have him touch the tip of his nose with his left index finger three times in succession. (3) Repeat with the right index finger. (4) Have the student stand with his arms relaxed at his sides and his heels together. (5) Have him touch the tips of his index fingers of his left hand and his right hand together in front of his face. (6) Have the blindfolded student sit on a stool. (7) Have him take his left heel and hit it against the right knee cap three times. Repeat with the right heel on the left knee cap.

Requirements.—Record the total number of hits and misses for three trials at each test. If the total number of hits is greater than the number of misses, the student has passed the test for all classifications.

Ability to Relax.—Pilots are frequently characterized as "easy-going." A successful pilot must be able to relax in order to eliminate tension while operating the controls.

(*Continued on page 22*)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Project of the Month:

A Commando Course

BY *Harold Isaacson* AND *L. Robert Mackey*

THE idea of putting our boys on a "Commando" basis came last summer to Harold Isaacson, Director of Physical Education, and Coach Lester Galitz who also teaches mechanical drawing when they attended a short course in gymnastics at the Navy's Preflight School at Iowa City, Iowa. There, an obstacle course, utilizing to advantage rough features of the ground, was in full use. They returned to Niles Township High School with the determination to construct an obstacle course of their own.

Dr. A. L. Biehn, the Superintendent, and the Board of Education, approved the project, but several questions arose: Where shall we obtain the labor for the construction? From whom shall we get the material, and what would the cost of the course be?

The school shop department volunteered to build the course. The Northern Illinois Public Service Company donated 350 feet of old telephone poles and 178 feet of 1½" galvanized pipe was secured from an old greenhouse.

The obstacle course is perhaps the most valuable piece of outdoor physical education equipment the school has. It is used by the boys' classes each period every day during the outdoor program.

The class is assembled at the center of the practice field, encircled by the course, and after roll is taken by teams, the boys start on the course. The winner's time is announced after the run is completed, and the boys try hard to better their times each time they run it. The run is used as a warm-up before the touch football, soccer, and other games.

The 520-yard course herein described consists of nine obstacles arranged on the outside edge of our practice field, which is bounded by shrubs and trees as shown in diagram.

First are the balance beams, which are somewhat like thin-topped fence rails. The three rails are 2"x8"x18' and are inserted in a 6" slot in top of three 4½' poles. These poles are placed 3' in the ground and the railings are held in slots by long lag screws.

Next in line comes obstacle No. 1A. This is a synthetic hill built between two trees about 3' apart which have low hanging branches reaching approximately 4' from the top of the hill. The hill was made of soil and sod obtained when building other obstacles throughout the course.

Obstacle No. 2 is the hand-over-hand. This is made of three 1½" pipes set lengthwise of the course and supported 9' above the ground on a wooden framework 22' long. The 9' height above the ground is set to permit clearance for even the tallest boy and at the beginning of this obstacle, steps are placed on the inside of the post to enable the smaller boys to reach the pipes.

Obstacle No. 3 consists of a pair of water hazards. There are two jumps in this hazard. The first is 10' wide and 8' long. There is a 4' landing between the two holes and then comes the second jump of 4'. The holes are about 2' in depth and the front and back side of each one is walled up with one 2x10" brace fastened on each side of the wall. The top of each back wall is padded to prevent injury should any boy fail to make the jump.

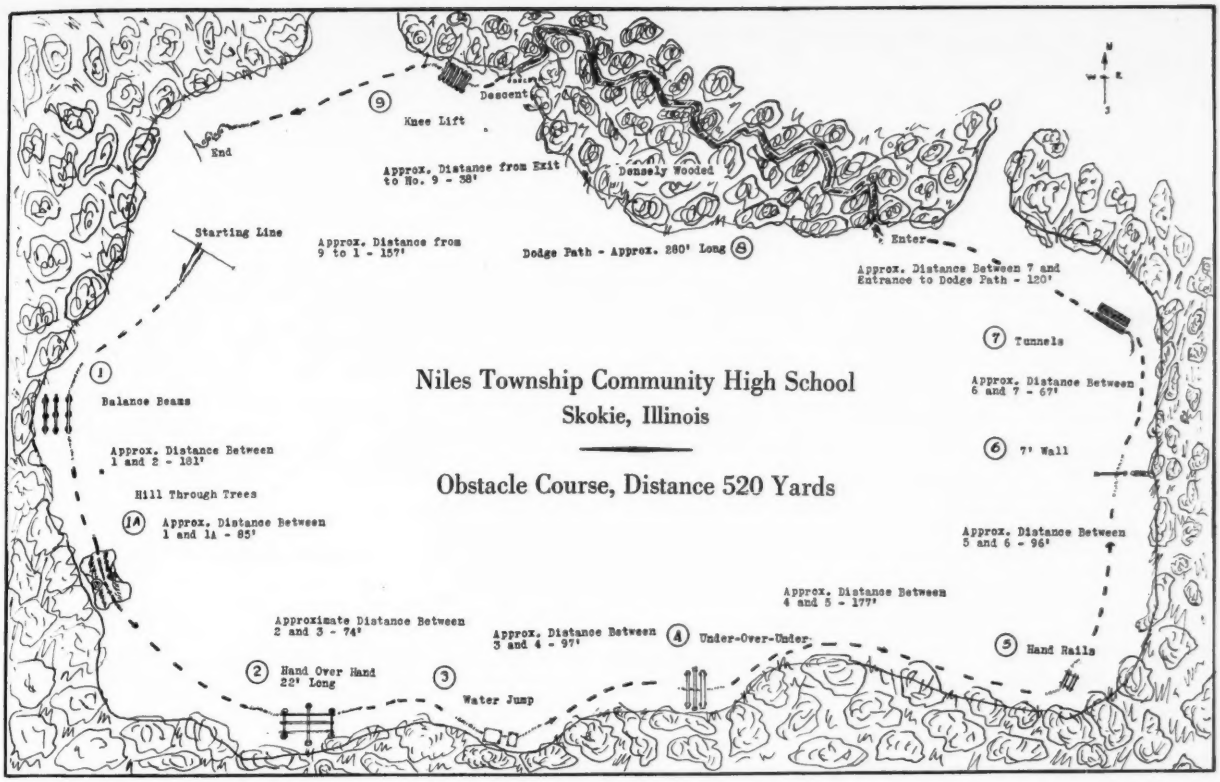
For obstacle No. 4 we have the under-over-under. First there is a 14' pole extended about 20" from the ground. This is supported at each end by two upright posts that are cut to fit the pole. There is a distance of 4' from this pole to a wall 5' high and 12' long. The wall is supported by grooved end posts which are set 4' into the ground. The end posts are made of two 2x10" boards laid together, then two 4x4" posts are bolted on each side, leaving a 1¾" groove so that the wall can be slipped into the grooves. The wall is strengthened by screwing two 2x8" strips on the back. They are beveled away at the top to prevent injury. Behind the wall there is another under obstacle—the same as the first under-crawl.

Obstacle No. 5 is two pair of parallel

Here is a shop activity which ties in with the Victory Corps program and gives shop students a real opportunity to help with an extremely timely school war effort. Harold Isaacson is Director of Physical Education and Athletics and L. Robert Mackey teaches industrial arts and coaches at Niles Township High School, Skokie, Illinois.

Swinging along on the "hand-over-hand."

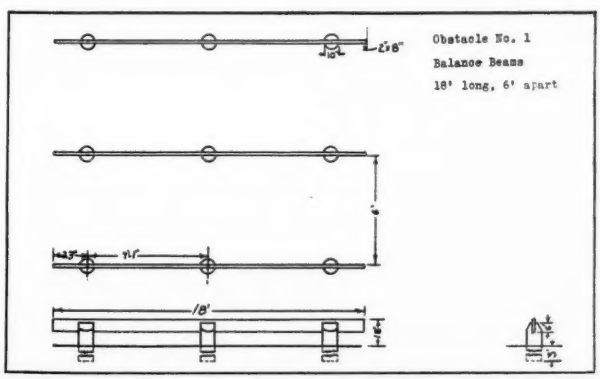
Scaling the wall to build up muscle and agility.

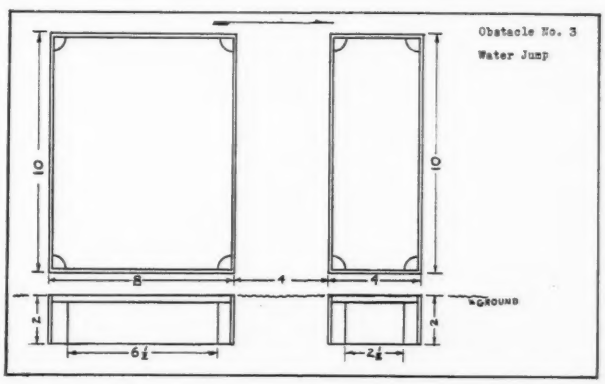

Niles Township Community High School
Skokie, Illinois
Obstacle Course, Distance 520 Yards
Descent
Knee Lift
End
Approx. Distance from Exit to No. 9 - 38'
Densely Wooded
Starting Line
Approx. Distance from 9 to 1 - 157'
Dodge Path - Approx. 280' Long
Enter
Approx. Distance Between 7 and Entrance to Dodge Path - 120'
Tunnels
Balance Beams
Approx. Distance Between 6 and 7 - 67'
7' Wall
Approx. Distance Between 1 and 2 - 181'
Hill Through Trees
Approx. Distance Between 1 and 1A - 85'
Approx. Distance Between 5 and 6 - 96'
Approx. Distance Between 4 and 5 - 177'
Approximate Distance Between 2 and 3 - 74'
Approx. Distance Between 3 and 4 - 97'
Under-Over-Under
Hand Rails
Hand Over Hand 22' Long
Water Jump

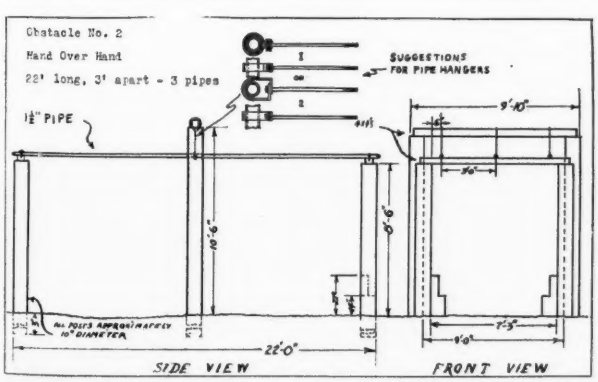
hand rails. They are made of 1½" pipe, connected by pipe T's. The rails are 3½' feet from the ground and the uprights are placed in holes filled with concrete to support the hand rails.

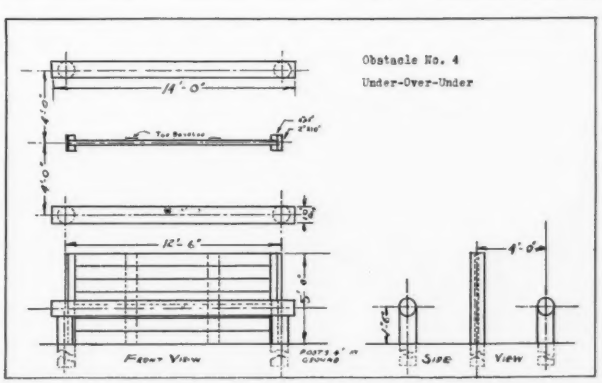
Obstacle No. 6 is a 7' wall, constructed the same as the 5' wall in obstacle No. 4. However, the grooved posts extend 18" above the wall. Knowing there would be a few boys who could not scale the wall, we constructed a ladder on one side of the wall. This was made by placing two 10' poles 5' apart. The rails of the ladder were nailed irregularly and the back sides of the rails were nailed opposite to those on the front side, thus making it more difficult to climb.

Obstacle No. 7 is the under-crawl









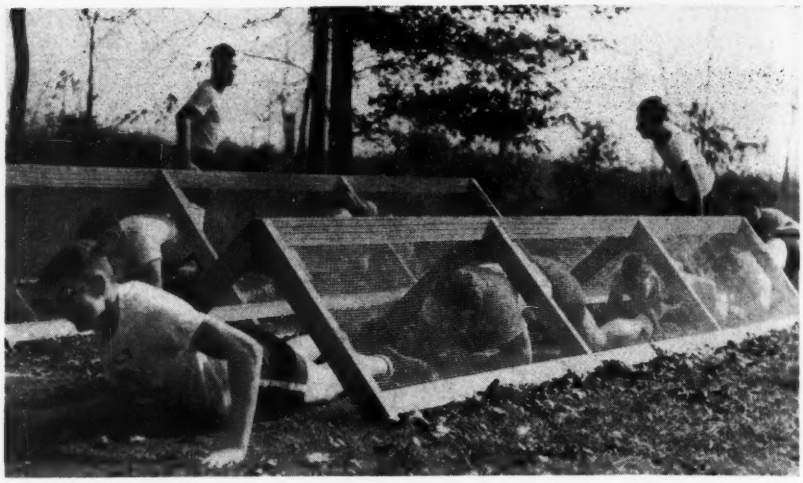
tunnels. These were made 24″ and 20″ from the ground. The latter is for the use of the smaller students. Each tunnel is 20′ long. All the lumber used in their construction is 2x4's. They have the appearance of gable roof and are roofed with 1″ heavy wire netting. Netting was used so that the sun could penetrate and dry the sod after a rain.

Obstacle No. 8 is a dodge path. This must be run in zig-zag motion for 280′. The path is cleared through a thickly shrubbed and wooded part between the athletic and practice fields.

Obstacle No. 9—knee lifts—consists of a battery of five 16′ poles 20″ high and centered 3′ apart. Each pole is supported by three upright posts set 30″ in the ground, which were cut to fit the poles. The poles are held in place by steel straps screwed to each side of the posts.

The course is ended by weaving between 4″x4″ posts which are used to hold a baseball back stop.

The total cost of our obstacle course was approximately $75.00. This includes the cost of the necessary lumber, hardware, paint, and wire netting used in its construction. Our shops—three classes daily—spent about four weeks, under difficult weather conditions, in building the course. We think the expense involved and the time spent in its construction are indeed small compared to the benefits that have already been derived by our students from this "Commandos Course."



Crawling through the tunnels. Note that shorter boys go through the smaller of the two tunnels.

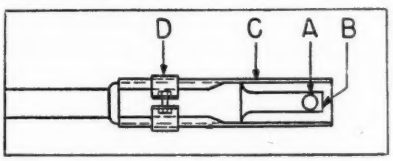
All the drawings submitted are by the Niles Township High School Mechanical Drawing Department which is under the instruction of Mr. Lester Galitz, and all the pictures are through the courtesy of the *Chicago Daily News*.

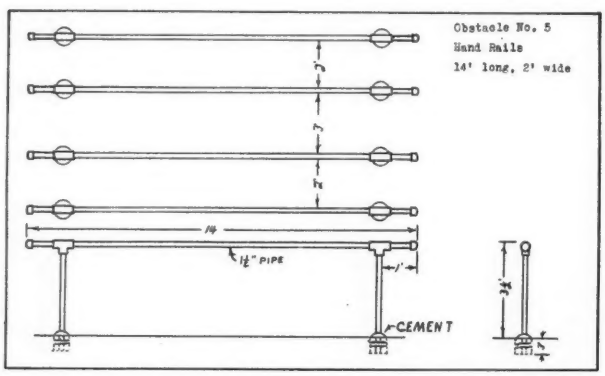
Simplied Small Wire Soldering

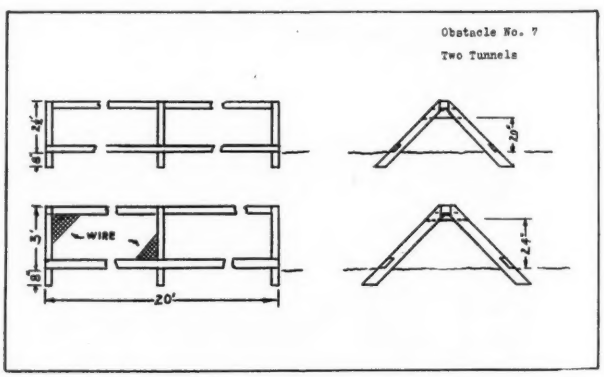
THE job of soldering small wire connections is simplified at General Electric by making the iron stationary and dipping the connections into a small hole filled with solder near the tip of the iron.

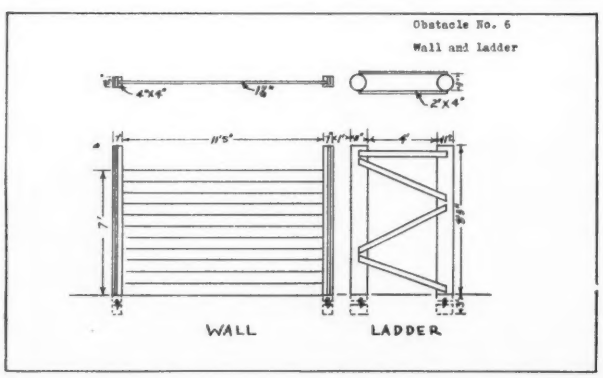
As shown by the drawing, the soldering iron can be fixed for use in this manner by drilling a hole (A) into the tip (B). A nickel-steel tip will last longer than other types.

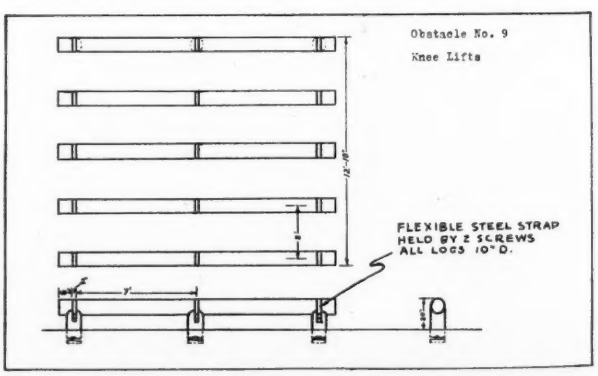
The drip and splash guard (C) catches surplus or drips of solder coming off the iron. It is made of 1/32-inch steel and is fastened to the iron with a hose clamp (D).

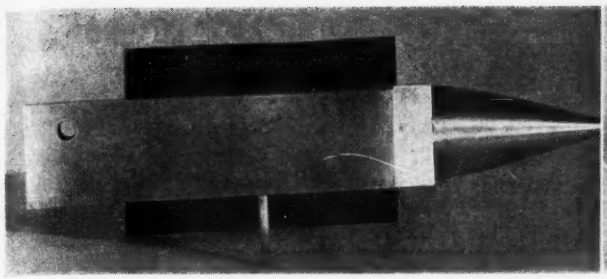




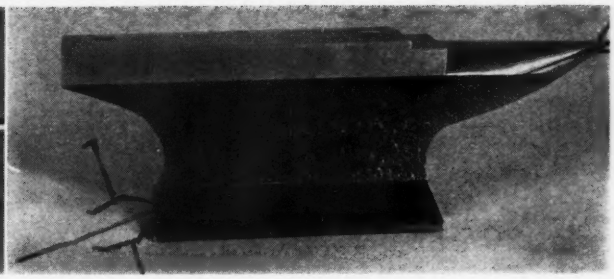








Top view of anvil, showing shape of horn and tool hole.



Black line indicates the center line of the lathe. Mount like this for turning.

Projects from Rails

BY *Ralph W. Baughman*

Although the author, who teaches at the Bremerton, Wash., High School, states that these projects are not as well finished as those made from other than steel rails, the editor can vouch for their neat appearance and utility as he has one of the anvils and one of the grinding arbors in his own workshop which were made by Mr. Baughman's students. This is a notable illustration of the use of scrap materials for educationally sound projects.

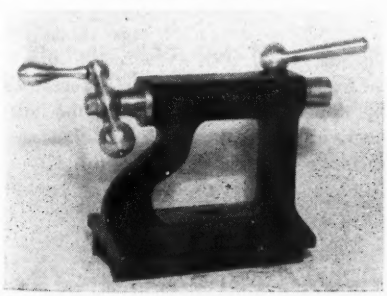
TESTED 55 INSTRUCTIONAL PROJECT

THESE projects developed after a fruitless search for good machine-shop projects which led to the conclusion that this phase of school shop work is badly neglected. Also, many students cannot afford to pay for castings required for some of the more ambitious types of projects. What was wanted was a simple project which could be taken home by the boy for everyday use, to be followed by more complicated projects requiring higher skills but still offering the motivation which comes through working on something to be taken home for the workshop. A student should not be required to do monotonous work just because he cannot afford to buy material.

Accompanied by the entire class, I investigated some abandoned logging railroads in the vicinity. Our search resulted in securing about 10,000 pounds of rails of various sizes. Material for the larger projects is purchased from dealers.

The anvil is the most popular project we have for beginners. Any instructor knows that a boy will work hard at anything that he is interested in, and this anvil seems to do the trick. Because of the many sizes of rails, I have never made any scale drawings, preferring to have the boys make free-hand sketches.

Lathe tailstock made of rail.



To machine the anvil, first cut the rail about ½″ longer than the finished anvil will measure. This will allow for center drilling. After deciding the length of horn wanted, this distance is measured back from the end of the rail where a cut is made through the base, taking care not to cut more than ¼″ into the web.

The base is next cut at the other end, the cut going half way through the rail. A row of 5/16″ holes is drilled from the saw cut, the pieces being broken off. To locate the points for center drilling, measure down about ⅜″ to ½″ from the top of the horn end of the anvil, depending of course on the size of rail used, and center punch.

Next, on the opposite end of the rail measure up about ½″ from the bottom and center punch. When setting up the work in the drill press to center drill, see that the punch marks are perpendicular to each other.

To turn the horn we turn a center in the chuck and mount the anvil so the chuck jaws will drive it. Next, set the compound rest of the lathe at the same angle as that formed by the top of the anvil and the center line of the lathe. To do this we rotate the work until the top of the anvil is facing the tool; then the compound is adjusted until the tool will travel parallel with the top of the anvil. The procedure from then on is the same as that used in turning a cone.

Before starting the cut, it is well to plainly mark where the cut is to end. Do not neglect this precaution.

After the horn has been turned and the center cut off, the student should be instructed to file the bottom and sides of the point only, as any filing on top of the point of the horn will only spoil its appearance. A good looking job often starts a home workshop and prompts the desire to build other tools.

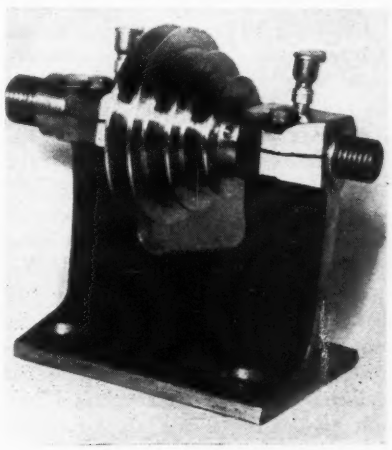
Our companion job to the anvil is a pair of parallel clamps of 1¼″ square iron with one leg of the clamp long enough to bolt to a bench. This is suitable for filing and drilling light material.

For more advanced students we have designed grinder arbors and wood lathes. The lathes are more than a toy, the larger ones having about a 12″ swing. Bronze bearings about 2¼″ long are used, line reamed for a 1″ shaft. The tail stock of one of the lathes is pictured below. The scrap is purchased for the larger lathes for which rails are unsuited.

The style and size of arbors is unlimited. We have used everything from the smallest rails for buffing arbors up to 130-pound rails for saws and heavy grinders.

We have a lathe and a grinder which we will be glad to loan to any responsible school interested in these projects if it will pay the freight both ways. Each one weighs about 75 pounds, boxed.

Grinding arbor complete with oil cups.



"Water-Analogy" Method of Teaching Capacitance and Inductance Effects

BY *Frederick C. Kulieke, Sr.*

Clarity in teaching capacitance and inductance effects is possible by use of this method, using energy-flow through water as an analogy. Author Kulieke teaches electrical communications at Lane Technical High School, Chicago.

ELECTRICAL science presents difficulties in the way of explaining and understanding many effects and their causes. The effects of capacitance and inductance in radio circuits are typical of such problems. Water, which is a far more tangible medium of energy conduction than the infinitesimal particles of matter constituting electrical conductors, serves very nicely as an analogy in such explanations. A caution should be given that not all of the water characteristics should be applied to the electrical phenomena.

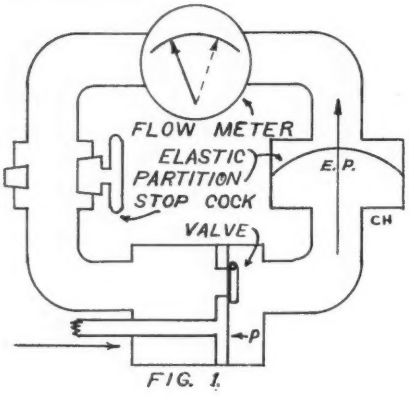


FIG. 1.

Figure 1 is a water analogy illustrating the action that takes place in a *direct-current* circuit with a condenser in series, shown in Figure 2.

In Figure 1, when the stop-cock, *sc*, is turned as shown, the piston *p*, forces water upward into the chamber, *ch*, at the right. This forces the elastic partition, *ep*, upward, driving water to the left through the flowmeter. The back force of the elastic partition reaches the same value as the forward pressure of the piston and the water no longer flows through the meter which returns to zero.

In Figure 2, when the switch, *sw*, is closed, electrons are driven from the negative terminal of the battery into the lower plate of the condenser causing the ammeter, *a*, to indicate electron flow until the elastic tension, similar to the

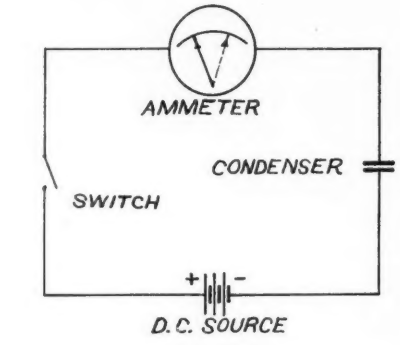


FIG. 2.

As long as the switch is closed there is no further flow of electrons or current. It is said, therefore, that a condenser acts as an open in a D.C. circuit. In radio circuits, condensers are used in this way as blocking condensers to keep D.C. from flowing through their paths.

Figure 3 is a water analogy illustrating the action that takes place in an *alternating-current* circuit with a condenser in series, shown in Figure 4.

In Figure 3 when the stop-cock, *sc*, is turned as shown, the piston moving toward the right, forces water upward, bringing the elastic partition upward, forcing water to the left through the flowmeter. The piston is drawn back to the left (position dotted). Dotted lines indicate motion of water and the elastic partition forced downward. This forces water and pressure to the right through the flowmeter (dotted). When the piston is driven forward and back, the water swishes upward and downward, driving the elastic partition in the same way. The flowmeter indicates motion of the water to the left and then to the right, etc., although *no water*

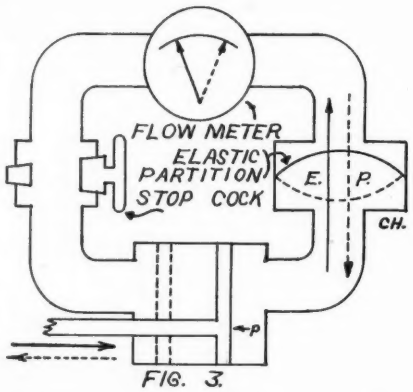


FIG. 3.

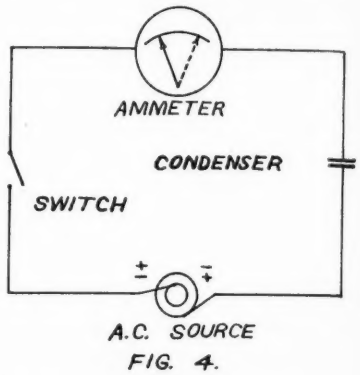


FIG. 4.

passes through the elastic partition.

In Figure 4, when the switch is closed the A.C. generator drives electrons first into the lower plate of the condenser indicating flow on the ammeter, and then into the upper plate of the condenser indicating flow of current in the opposite or reverse direction on the ammeter. The ammeter indicates that alternating current is flowing through it although no *electrons* flow through the dielectric of the condenser. Let it be understood then that the A.C. generator is run at a slower speed to produce a low enough frequency so that the meter will be able to follow the reversals of current; otherwise it would quiver at zero. In radio circuits condensers are used as bypass condensers to bypass A.C. currents around devices that choke their flow.

Figure 5 is a water analogy illustrating the action that takes place in an *alternating-current circuit* with an inductance or coil in series, shown in Figure 6.

This effect is not present in a direct-current circuit, for in such a circuit the coil offers *only* resistance because the current flow does not change.

In Figure 5, when the cock is turned, as shown, the piston moving toward the right forces water around to the left through the flowmeter and expanding the elastic sleeve. When the piston moves to the left the water is forced in the opposite direction through the flowmeter and even though the elastic sleeve squeezes together some, it is forced outward again by the reserve pressure. Thus the sleeve *uses up* some of the power when it is forced outward and returns some of this power between

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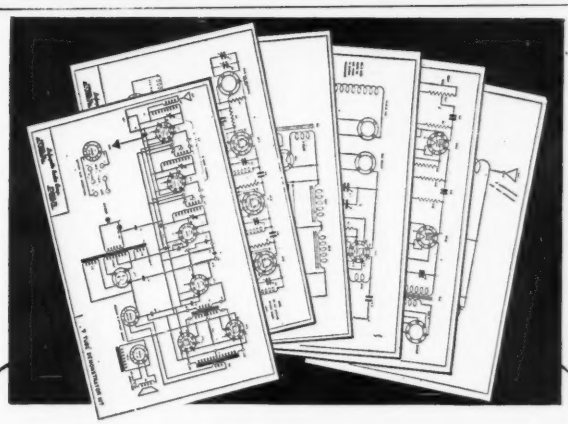

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alternations, but it *does not return all* of the power before the next pulse of pressure drives it outward again. The flowmeter shows relatively less water flow than were the elastic sleeve not in the system.

In Figure 6, when the switch is closed the magnetic field of the coil builds up. The magnetic lines of force expand outward like elastic bands, cutting the turns of the coil, inducing a back pressure. This takes place when the current flows to the left through the ammeter. When the current reverses its flow, that is, alternates, the magnetic field collapses and builds up again with the polarity for the field of the coil this time opposite to its polarity for the first flow.

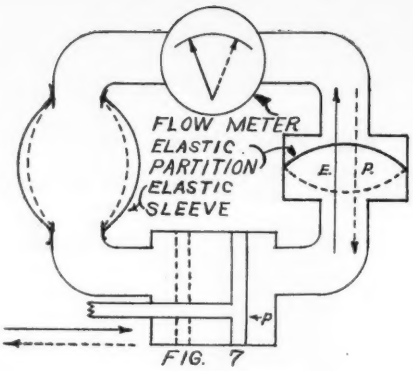

FIG. 7

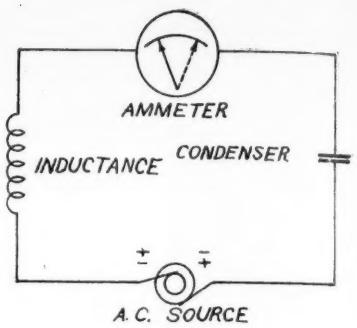

FIG. 8

However, here the collapsing field cuts the turns of the wire in the reverse direction attempting to sustain the original flow of current and creates a new back pressure opposing the reversal build-up of current. The induced voltage always is in opposition to the live voltage. This causes absorption of some power by the magnetic field that is not returned to the circuit. In other words the ammeter shows less current flow with the wire coiled *than with the same wire uncoiled* and stretched out straight. The wire coiled, therefore, offers *inductive opposition* or *inductive reactance* to the flow of the alternating current.

The inductive reactance, which is simply the tendency of the voltage of selfinduction to react against the charge in current, may be great enough to partly or entirely *choke* the current flow.

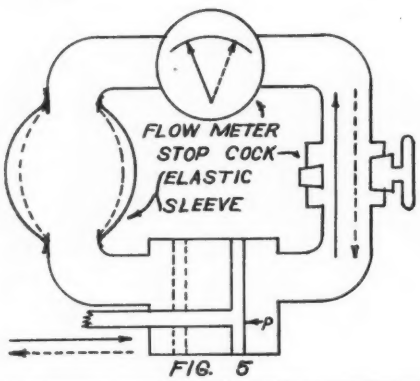

FIG. 5

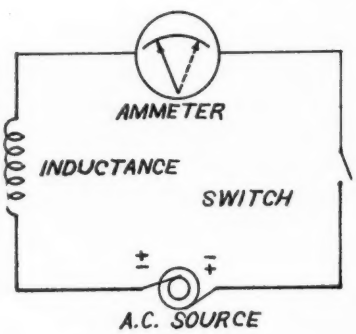

FIG. 6

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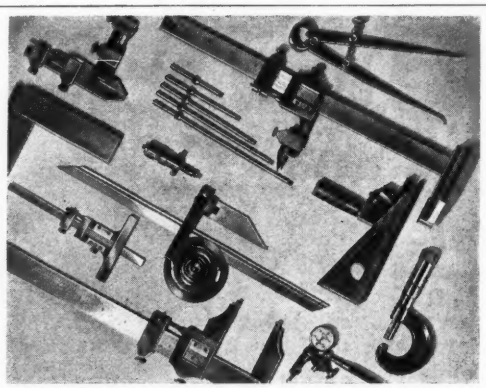

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Figure 7 is a water analogy of a condenser and an inductance in series with an A.C. generator as shown in Figure 8.

In Figure 7 the effect of the elastic sleeve is of an opposite nature to that of the elastic partition so that when both are of a suitable size and elasticity-force

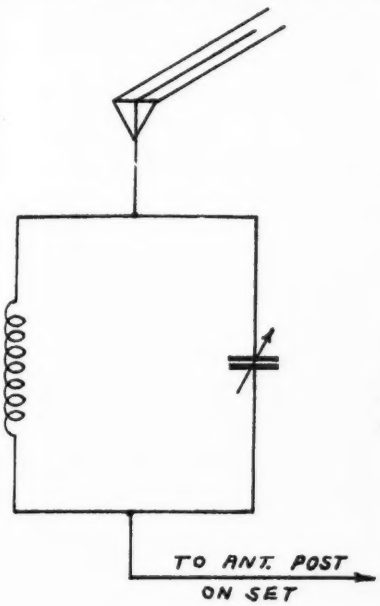

FIG. 9.

for a certain number of strokes per second of the piston (its frequency), the flow meter will indicate maximum current equal to that were the two devices not in the system. The one equally offsets the other.

In Figure 8 when the condenser and inductance are of suitable values for a certain A.C. frequency there results the condition of *resonance*. When this is true the total opposition to the current flow in the circuit is only the *ohmic resistance* and the *current* is of maximum value. This is known as *series resonance* because the current source supplies the current in series with the coil and condenser. The same is true when the coil is the secondary of a radio frequency transformer, for then the current is induced directly in the secondary coil. This arrangement is known as a receptor circuit for it offers *no* opposition to the flow of currents of the frequency to which it is resonant.

Figure 9 shows a *parallel resonance* arrangement. The current from the antenna attempts to divide between the coil and the condenser. This is known as a rejector or trap circuit for at resonance this coil and condenser combination offers the *greater* opposition to the flow of currents to which it is resonant.

Strictly Personal...
ABOUT YOUR FELLOW TEACHERS

RANDOLPH KARCH has been granted leave of absence as principal of Cincinnati Printing High School to engage in work with the Navy as Instructional Coordinator at the Naval Training School, Memphis, Tenn. . . . LaPorte, Indiana, has a new vocational director in EDGAR E. HOBBS, who replaces H. W. SCHULZE. Schulze is now supervisor of trade and industrial education, State Department of Education, Indianapolis . . . Following the recent death of F. M. HARMAN, FRANK R. FLOWER has been appointed to take his place as assistant superintendent of schools, Atlantic City, N.J., in charge of vocational education and industrial arts. He will also have charge of building maintenance . . . Two industrial education men have received $100 awards from the James F. Lincoln Arc Welding Foundation for their entries in the Industrial Progress Award Program. They are RAY F. KUNS, director of National Defense Training, Aviation High School, Cincinnati, and WINFIELD W. SCOTT, supervisor of industrial arts, Topeka, Kans.

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We announce—for use in your plant—a series of six training films covering the fundamentals of carbide tool manufacture, design, brazing, application and grinding. Based on more than a decade of experience in the art of cemented carbide use, the films are designed to speed the training of new men, apprentices, and those being converted to carbide tool use in the metal working industry. Also suitable as "refresher courses" for those with working knowledge of carbide tool use but who wish to review the latest techniques. Technically known as "film strips"—containing illustrations and explanatory text—these films are designed for step-by-step training in the following subjects:

Not Motion Pictures
Carboloy training films are technically known as "film strips", or silent slide films (35mm), containing illustrations and explanatory text for detailed training purposes.

SUBJECTS

Film No. 1—"WHAT IS CEMENTED CARBIDE?"
Designed to provide a knowledge of what cemented carbide is, physical characteristics, and how made. Valuable as a basis for understanding reasons for recommendations in subsequent films.

Film No. 2—"DESIGNING CARBOLOY TOOLS"
Reviews for tool designers, the special requirements necessary in designing tools with carbide tips. Covers tool styles, tip and shank sizes, rakes, etc., for single point tools.

Film No. 3—"BRAZING CARBOLOY TOOLS"
Detailed, step-by-step procedure for torch brazing carbide blanks to steel shanks. Includes brazing of single and multiple point tools, how to renew worn-out M.S.S. cutters with carbide tips, etc.

Film No. 4—"CHIP BREAKERS"
Shows how to determine most efficient chip breakers for carbide steel cutting tools; how to adjust to meet individual conditions; and step-by-step procedure for grinding rapidly and accurately.

Film No. 5—"GRINDING CARBOLOY TOOLS"
Step-by-step grinding procedure for single point carbide tools from brazed, damaged and ordinary dulled states. How to rough rapidly and finish accurately. Equipment, wheels, accessories.

Film No. 6—"PUTTING CARBOLOY TOOLS TO WORK"
Important for the operator applying carbide tools. In three parts: Part I—Putting tool on machine. Part II—The machine. Part III—Trouble shooting. What to do when the job doesn't "click".

AVAILABLE FOR PERMANENT USE AT COST OF PRINTS ONLY

So that industrial concerns and educational institutions may incorporate these films as a permanent part of their war training program, prints are available for purchase at approximate print cost of $20.00 for set of 6. (Entire cost of film production has been absorbed by Carboloy Company.) One complete set of six reference manuals and one instructor's manual included.

Films also available to educational institutions through college film loan libraries. List on request. No direct loans by Carboloy Co.

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The Print Shop Helps Build Model Airplanes

BY *David M. Teichler*

TESTED 55 INSTRUCTIONAL PROJECT

DISAPPOINTMENT was evident upon the faces of the boys in the print shop when word came that our school was to build model airplanes for the United States Navy. Of course, we had no woodworking tools or vises, so our department could not participate.

Fortified by the desire to become part of this patriotic work, some of the boys secured the plans for one of the model planes and consulted with their instructor as to the use of a printing process which might make some of the details easier to work out. The parts shown on the plans were to be made from various thicknesses of wood but, aside from the fuselage, the thickest piece measured 3/16″. Die cutting had been successfully done on cardboard stocks in the shop and it was determined to try die-cutting the wood parts right on the press.

First an attempt was made in the woodworking shop to make the dies but, without the bending device which is standard equipment in die-cutting shops, the steel cutting rules could not be bent accurately to size. A call on a local box manufacturer met with generous co-operation and the dies for the wing, the stabilizer, the fin, and the fillets were fashioned to the exact dimensions given on the plans.

Before the cutting could be started, it was necessary to have wood of proper thickness. This was accomplished in the woodworking shop through the use of a do-all machine. The wood was ripped down to 3/16″ for the wing and 3/32″ for the other parts. The peculiar airfoil on the upper part of the wing had to be shaped beforehand using a device similar to a molding machine (specially devised in our school machine shop). After obtaining airfoil and thickness the long strips were cut down to press size.

The press upon which the die cutting took place was a regular Chandler & Price 12x18. The makeready was simple involving the use of a sheet of tin on the top sheet to insure clean cutting by the rules. The tin plate was pasted on the sheet close to the guides. The impression on these small die forms was quite light, being just enough to cut through the wood stock. Without strain on press or feeder, parts were die cut at the rate of 100 per hour. They required but the lightest sanding to be ready for use in the assembling. The sponge rubber surrounding the cutting rules made separation of die and wood stock as easy as with cardboard. The ease of cutting increased with the thinner wood parts.

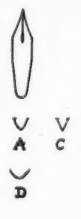
The success of our venture was reflected in the renewed fervor with which all the boys tackled the assembling and finishing of the models. The die cutting had made some of the most difficult pieces easy, requiring only some minor work to complete.

To the instructor it was an opportunity to demonstrate the versatility of the printing press; to the students it was a patriotic duty they could share along with other shops; and to the government it represented a greater volume and more accurate plane models for use in training "spotters" and members of the armed forces.

Here is a variation of the usual mass-production technics utilized in making planes for the Navy. Mr. Teichler teaches printing in the Brooklyn High School of Automotive Trades. Below may be seen a die locked up in the press with the student holding a die-cut wing and several stabilizers.

Linoleum Block Knives from Pen Points

1. USE STRAIGHT SIDED PEN POINT SIMILAR TO GILLOTTE 303 OR HUNT.
2. HEAT TO RED HEAT OVER GAS FLAME ETC, & ALLOW TO COOL TO REMOVE BRITTLENESS.
3. KNIFE "A" IS USUAL SHAPE AFTER SQUEEZING WITH PLIERS. "B" & "C" POSSIBLE WITH MORE CARE. "D" REQUIRES NO SQUEEZING.



4. SHARPEN CUTTING EDGES WITH FILE OR EMERY PAPER.
5. INSERT IN COMMON PEN HOLDER "IN REVERSE"

By F. N. Newton, Jr., Sharon, Penna.

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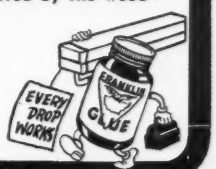

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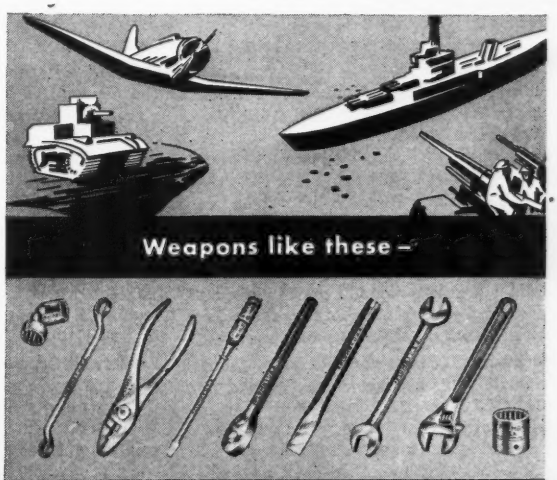

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instructional resources

. . . for Pre-Induction Training

HERE is as complete a bibliography of pre-induction training materials as it is possible to prepare. Books are listed in two sections: (1) Those prepared especially for pre-induction courses, and (2) those not so prepared but of value as text or reference in such training.

There are many pre-induction books not listed here because they have not yet been completed and no data on them were available. Readers are urged to consult SCHOOL SHOP's *Instructional Resources* department each month for data on forthcoming pre-induction texts.

[In preparing this bibliography, SCHOOL SHOP contacted all publishers for lists of their books. Addresses of all publishers responding are given on page 20.—*Ed.*]

Fundamentals of Shop Work

Fundamental Shop Training. Shuman, Monroe, Wright. Chicago: American Technical Society, 1943. $2.50 (includes workbook).

Workbook is available for use with text, which covers fundamental operations and best practices used by skilled workers.

Fundamentals of Shopwork. Wicks, Poliacik, Ellberg. New York: American Book Co., 1943. Pp. 160. $1.12.

Practically a "selfteaching" text with ample problems and projects.

Fundamentals of Shopwork. Gunerman, LaFon, Swartz. New York: Henry Holt & Co., 1943. $1.48 (probable price).

One-semester text containing demonstrations, questions, problems, selftesting exercises, glossary, and experiments. Teachers' manual.

Fundamentals of Shopwork. Johnson, Newkirk. New York: The Macmillan Co., 1943. Pp. 224. $1.32.

Basic course in skills and practices leading to a number of essential Army occupations. Illustrated with step-by-step procedures.

Fundamentals of Shopwork. Godwin, Owens, Slingluff. Philadelphia; John C. Winston Co., 1943. $2.00 (tentative).

Course divided into three parts: woodwork; metalwork; cables, ropes, splices. Emphasis on items contributing to specialized Army work.

Introductory Shopwork. Jones, Axelrod. New York: McGraw-Hill Book Co., 1943. $2.00.

Explains every step of shopwork, from correct ways of handling and using tools to efficient methods of doing jobs. Illustrated.

Pre-Service Course in Shop Practice. Kennedy. New York: John Wiley & Sons, Inc., 1943. Pp. 337. $1.52.

Covers hand and machine tools, their use and care; measuring tools and instruments; woodworking; metalworking.

Fundamentals of Shopwork (visual learning guide). Chicago: National Audio-Visual Council, 1943. $1.45 (per package of 50).

A visual learning guide for use with motion pictures on shopwork. Contains notes on what to look for in *Erpi* and *Office of Education* films; needed vocabulary; test questions, etc.

Fundamentals of Automechanics

Elements of Automotive Mechanics. Heitner, Shidle, Bissell. New York: D. Van Nostrand Co., 1943. Pp. 395. $1.92.

Separate units on running system and bodies; power train; power unit; cooling system; etc. Photos, drawings, diagrams. Unit on safety.

Fundamentals of Automotive Mechanics. Barger. New York: American Book Co., 1943. Pp. 166. $1.12.

Covers first half of War Department pre-induction course. Volume II is forthcoming, to cover other half.

Pre-Service Course in Auto Mechanics. Frost. New York: John Wiley & Sons, Inc., 1943 (price undetermined).

Teaches names, locations, and principles of operation of various units of the car. Covers two semesters' work. Stresses theory.

Fundamentals of Radio

Elements of Radio. Marcus and Marcus. New York: Prentice-Hall, Inc., 1943. Vol. I, pp. 331, $1.96. Vol. II, pp. 375, $1.96. Both vols. $3.20.

Presents basic principles in terms student can understand without previous radio, physics, or higher mathematics training.

The Elements of Radio. Hellman. New York: D. Van Nostrand Co., 1943 (price not determined).

Follows closely the course outline and content as requested by War Department and U.S. Office of Education.

Fundamentals of Radio. Williams, Scarlott. New York: American Book Co., 1943. Pp. 132. $1.04.

Chapters on radio in general, language of radio, electrical theory, alternating currents, properties of inductance, etc.

Pre-Service Course in Radio. Zeluff, Painting. New York: John Wiley & Sons, Inc., 1943 (price to be determined).

Two-term course, beginning with development of present-day radio. Then study of electrical theory and specific radio material important to Army work.

Understanding Radio. Watson, Welch, Eby. New York: McGraw-Hill Book Co., 1940. Pp. 575. $2.80.

Designed for beginners with no knowledge of radio principles. Covers fully pre-induction course in radio.

Fundamentals of Electricity

Basic Electricity. Feirer, Williams. Peoria: The Manual Arts Press, 1943. Pp. 244. $1.92.

Explicit summaries, questions, special military and general problems, and laboratory activities at end of units. Glossary; appendix. Based on Army outline PIT-101, with added material.

Basic Electricity. Beauchamp, Mayfield. Chicago: Scott, Foresman & Co., 1943. Pp. 300. $1.60.

Includes special teaching technics to meet needs of both superior and slower students. No knowledge of electricity or other science training needed.

Elementary Electricity. Rev. Ed. Slack. New York: McGraw-Hill Book Co., 1943. Pp. 308. $2.00.

Simple, practical, for the beginner. Covers *ac* and *dc* and based on modern electron theory. Illustrations; examples; problems.

The Elements of Electricity. Hausmann. New York: D. Van Nostrand Co., 1943. Pp. 251. $1.24.

Chapters cover magnetism, electrostatics, primary cells, storage battery, voltage, current, resistance, work, energy, power, etc.

Fundamentals of Electricity. Carnegie-Illinois Steel Corp. New York: American Book Co., 1943. Pp. 194. $1.16.

Based on material developed for teaching learners and apprentices at Carnegie-Illinois Steel Corp. Rewritten for pre-induction courses.

Fundamentals of Electricity. McDougal, Dunlap, Ranson. Chicago: American Technical Society, 1943. $2.50 (includes workbook).

One-semester program. Accompanying workbook contains laboratory and project problems, and the "Six Step" plan of classroom training.

Fundamentals of Electricity. Williard. Boston: Ginn & Co., 1943. Pp. 351. $1.24.

Introduces each topic within a unit by a demonstration to serve as basis for discussion. Chapters conclude with questions, problems, and student exercises.

Fundamentals of Electricity. Miller. Boston: D. C. Heath & Co., 1943. Pp. 227. $1.00.

Topics introduced by demonstrations. Added demonstrations in appendix. Student experiments; chapter review; test questions.

Fundamentals of Electricity. Dull, Idelson. New York: Henry Holt & Co., 1943. $1.20.

One-semester book. Contains demonstrations, questions, problems, selftesting exercises, glossary, and experiments. Illustrated.

Fundamentals of Electricity. Johnson, Newkirk. New York: The Macmillan Co., 1943. Pp. 224. $1.32.

Basic courses in skills and practices leading to a number of essential Army occupations. Illustrated with step-by-step procedures.

Fundamentals of Electricity. Jones. Wichita. McCormick-Mathers Publishing Co., 1943. Pp. 96. $0.60.

In 12 teaching units. Set of five review tests with each book. Teacher's manual with class orders.

Fundamentals of Electricity. Benjamin. New York: Charles Scribner's Sons, 1943. Pp. 256. $1.20.

Contains War Department outline of course with page references where each topic is covered in the book. Photos; diagrams, etc.

Fundamentals of Electricity. Obourn, Montgomery. St. Louis: Webster Publishing Co., 1943. $0.72.

In text-workbook form; material organized on unit problem basis. Minimum of teacher planning. Illustrated.

Fundamentals of Electricity (visual learning guide). Chicago: National Audio-Visual Council, 1943. $1.45 (per package of 50).

A visual learning guide for use with *Erpi* and *U.S. Office of Education* motion pictures on pre-induction topics. Contains notes on

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THE FUNDAMENTALS OF SHOPWORK: A Pre-Induction Text

An introductory course furnishing information and practice leading to operative skills basic to Army service in a host of specialized fields. Operations in woodwork and metalwork are given, with special attention to ropes, knots, wiring, soldering, and other contributory Army occupations.

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what to look for; vocabulary; test questions; etc.

Instructional Tests in Electricity. Gruenberg, Obourn. Yonkers-on-Hudson: World Book Co., 1943. Pp. 32. $0.16 each; $5.00 for 50. Directions and key, $0.04.

A practical aid in achieving mastery of the fundamentals.

Pre-Service Course in Electricity. Shea. New York: John Wiley & Sons, Inc., 1943. Pp. 276. $1.52.

One-semester course covering electrical material needed in Army radio, aviation, mechanics, and allied work.

Principles of Electricity. Cornetet, Fox. Bloomington: McKnight & McKnight, 1943. Pp. 254. (Price to be determined.)

Basic information supplemented by photos and drawings, with suggestions for demonstrations, experiments, and questions.

Fundamentals of Machines

Applied Mechanics and Heat. Smith. New York: McGraw-Hill Book Co., 1943. $2.00.

Develops fundamental principles including measurement and measuring instruments, composition of forces, simple machines, sources and transmission of heat, etc.

The Elements of Machines. Verwiebe, Burns, Hazel. New York: D. Van Nostrand Co., 1943. Pp. 222. $1.24.

Basic principles explained in simple, clear terms, with illustrations. Large number of problems.

Fundamentals of Machines. Wallendorf, Stewart, Luedeke, Chiarello. New York: American Book Co., 1943. (In press) $1.24.

Fills all requirements of War Department pre-induction outlines, with additional instruction on allied subjects.

Fundamentals of Machines. Hobbs, Morrison, Kuns. Chicago: American Technical Society, 1943. $2.50 (including workbook).

One-semester text. Accompanying workbook contains laboratory and project problems and the "Six Step" plan of classroom training.

Fundamentals of Machines. Cushing. Boston: Ginn & Co., 1943. Pp. 436. $1.24.

Chapters include summaries and questions. Tables; illustrations, many of military applications.

Fundamentals of Machines. Dull, Newlin. New York: Henry Holt & Co., 1943. $1.32.

A one-semester text. Contains questions, problems, selftesting exercises, glossary, and experiments. Illustrated. Teachers' manual.

Fundamentals of Machines. Clark, Gorton, Sears, Crotty. Boston: Houghton Mifflin Co., 1943. Pp. 316. $1.24.

Follows topic by topic the War Department outline for the Fundamentals of Machines pre-induction course.

Fundamentals of Machines. Joseph. New York: Charles Scribner's Sons, 1943. Pp. 255. $1.20.

Contains War Department outline of course with page references where each topic is covered in the book. Photos; diagrams, etc.

Fundamentals of Machines. Obourn, Montgomery. St. Louis: Webster Publishing Co., 1943. $0.72.

In text-workbook form; material organized on unit problem basis. Minimum of teacher planning. Illustrated.

Instructional Tests in Machines. Gruenberg, Obourn. Yonkers-on-Hudson: World Book Co., 1943. Pp. 32. $0.16 each; $5.00 for 50. Directions and key, $0.04.

A practical aid in achieving mastery of fundamentals.

Pre-Service Course in Machine Science. Lebowitz. New York: John Wiley & Sons, Inc., 1943. (Price to be determined.)

Covers principles of physical science utilized in the operation of machines and tools. A one-semester text.

Radio Code Practice

Radio Code Practice Kit. $35.00.

Contains 17 12-inch, double-faced records, instructor's manual, 50 copies of printing chart and phonetic alphabet, and 1250 practice sheets. Distributed by: Thomas Y. Crowell; Ginn & Co.; Noble & Noble; Charles Scribner's Sons; Silver Burdett Co.

Other Texts for Pre-Induction Courses

The books listed below, although not prepared especially for pre-induction courses, are believed to be of value as classroom texts or reference books in all of the several pre-induction courses.

Shopwork

Basic Bench-Metal Practice. Giachino, Feirer. Peoria: The Manual Arts Press, 1943. Pp. 160. $2.75.

Dunwoody Machine Job Training Units. Chicago: American Technical Society, 1942. (Price varies for each unit.)

Fundamentals of Shopwork. Pamphlets; information must be had from publisher. Scranton: International Textbook Co.

General Shopwork. Ashcroft, Easton. Toronto: Macmillan Co., 1940. Pp. 239. $2.40.

Handwork in Wood. Noyes, Siepert. Peoria: The Manual Arts Press, 1941. Pp. 258. $3.00.

Machine Shop Practice. Hagberg, Corrington, Biehler. New York: Harper & Brothers, 1942. Pp. 311. $2.50.

Machine Shop: Theory and Practice. Wagener, Arthur. New York: D. Van Nostrand Co., 1941. Pp. 306. $2.28.

Machine Shop Work. Shuman. Chicago: American Technical Society, 1942. Pp. 499. $3.50.

Machine Tool Operation. Burghardt. New York: McGraw-Hill Book Co., 1941. Pp. 407. $2.25.

Manufacturing Processes. Begeman. New York: John Wiley & Sons, Inc., 1942. Pp. 579. $4.50.

Metal Processing. Boston. New York: John Wiley & Sons, Inc., 1941. Pp. 630. $5.00.

Methods of Measurement. Cornetet. Bloomington: McKnight & McKnight, 1942. $0.95.

Oxy-Acetylene Welding and Cutting. Giachino. Peoria: The Manual Arts Press, 1942. Pp. 196. $2.50.

Shop Theory. Henry Ford Trade School. New York: McGraw-Hill Book Co., 1942. Pp. 267. $1.25.

Technical Handbook. Lang. New York: Prentice-Hall, Inc., 1942. Pp. 100. $0.80.

Units in Forging and Welding. Smith. Wichita: McCormick-Mathers Publishing Co., 1941. Pp. 56. $0.48.

Units in Machining of Metal. Smith. Wichita: McCormick-Mathers Publishing Co., 1942. Pp. 128. $1.00.

Woodworking Workbook. Nichols, Stiles, Peoria: Manual Arts Press, 1942. Pp. 64. $0.56.

Workbook on Machine Shop Theory and Practice. Wagener, Arthur. New York: D. Van Nostrand Co., 1942. Pp. 188. $1.00.

Automechanics

Automotive Construction and Operation. Wright, Smith. New York: John Wiley & Sons, Inc., 1933. Pp. 435. $3.50.

Automotive Electrical Equipment. Crouse. New York: McGraw-Hill Book Co., 1942. Pp. 223. $4.00.

The Chevrolet Car and Truck: Construction, Operation, and Repair. Page. New York: Norman W. Henley Publishing Co., 1942. Pp. 873. $3.00.

Ford V-8 Cars and Trucks: Construction, Operation, and Repair. Page. New York: Norman W. Henley Publishing Co., 1942. Pp. 799. $3.00.

The Gasoline Automobile. Elliott, Consoliver. New York: McGraw-Hill Book Co., 1939. Pp. 754. $4.00.

Radio

Amateur Radio: A Beginner's Guide. Fortune, Chicago: Thordarson Electric Manufacturing Co., 1940. Pp. 155. $0.75.

Basic Radio. Hoag. New York: D. Van Nostrand Co., 1942. Pp. 380. $3.25.

Fundamentals of Radio. Pamphlets; information must be requested from publisher. Scranton: International Textbook Co.

Laboratory Manual in Radio. Almstead, Stone. New York: McGraw-Hill Book Co., 1943. (In press.)

Modern Radio Servicing. Ghirardi. New York: Radio & Technical Publishing Co., 1935. Pp. 1300. $5.00.

Perpetual Trouble Shooters' Manuals. New York: John F. Rider Publisher, Inc. (Prices vary for each volume.)

Principles of Radio. Henney. New York: John Wiley & Sons, Inc., 1942. Pp. 549. $3.50.

Radio: Fundamental Principles and Practices. Almstead, Davis, Stone. New York: McGraw-Hill Book Co., 1943. In press.

Radio Materiel Guide. Almstead, Tuthill. New York: McGraw-Hill Book Co., 1943. (In press.)

Radio Physics Course. Ghirardi. New York: Radio & Technical Publishing Co., 1932. Pp. 972. $5.00.

Electricity

Alternating Current Circuits. Morecock. New York: Harper & Brothers, 1942. Pp. 175. $2.75.

Elements of Electricity. Timbie. New York: John Wiley & Sons, Inc., 1937. Pp. 569, $3.00.

Experiments in Magnetism, Electricity, and Electro-Magnetism. Siskind. Vincennes: Universal Scientific Co., 1942. Pp. 67. $1.00.

Fundamental Jobs in Electricity. Perry, Schafebook. New York: McGraw-Hill Book Co., 1943. Pp. 445. $2.20.

Fundamentals of Electricity. Pamphlets; information must be requested from publisher. Scranton: International Textbook Co.

Guidance Text and Manual of Demonstrations. Lancaster. Vincennes: Universal Scientific Co., 1942. Pp. 150. $1.50.

Industrial Electricity. Timbie. New York: John Wiley & Sons, Inc., 1939. Pp. 635. $3.00.

Learning Electricity Experimentally. Siskind. Vincennes: Universal Scientific Co., 1942. Pp. 160. $2.00.

Practical Electricity. Croft. New York: McGraw-Hill Book Co., 1940. Pp. 701. $3.00.

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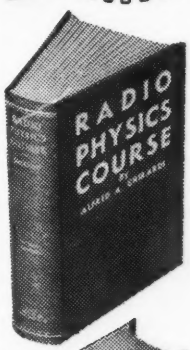

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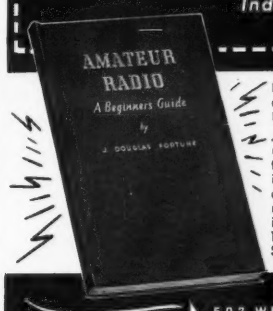

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cago: Scott, Foresman & Co., 1943. Pp. 320. (price not determined.)

Machines

Elementary Practical Mechanics. Jameson, Banks. New York: John Wiley & Sons, Inc., 1938. Pp. 363. $2.75.

Fundamentals of Machines. Pamphlets; information must be requested from publisher. Scranton: International Textbook Co.

Machine Shop Science and Mathematics. Eaton, Free. Peoria: Manual Arts Press, 1942. Pp. 177. $1.48 (paper); $2.00 (cloth).

Mechanical Physics. Dingle. New York: The Ronald Press Co., 1942. Pp. 248. $2.25.

Mechanics. Breneman. New York: McGraw-Hill Book Co., 1941. Pp. 146. $1.50.

Radio Code Practice

Radio Code Manual. Nilson. New York: McGraw-Hill Book Co., 1942. Pp. 170. $2.00.

IN THE *Morning Mail*

Gentlemen:

It is with much pleasure and satisfaction that I am receiving each issue of SCHOOL SHOP and I wish to take this opportunity to express my appreciation.

L. K. PERKINS, Boise, Idaho, High School

Gentlemen:

May I take this opportunity to congratulate you and your staff for your very interesting and helpful magazine. I am pleased to be on your circulation list.

JOHN F. SHEA, Hartford, Conn.

news

WHAT'S DOING IN THE FIELD OF INDUSTRIAL EDUCATION

THE American Industrial Arts Association convention planned at St. Louis for February 26 to March 1 has been indefinitely postponed. This action followed cancellation of the convention of the American Association of School Administrators, with which the A.I.A.A. customarily meets.

THE Indiana Industrial Education Association will meet March 26 and 27 at Indianapolis.

Federal vocational training programs have a new chief, Dr. W. W. CHARTERS, former director of the Bureau of Educational Research, Ohio University. To him have been turned over supervision of Vocational Training for War Production Workers, NYA, Training-Within-Industry, and Apprenticeship Service.

The Publishers . . .

HERE is a list of the publishers of pre-induction training texts and reference books. The address given in each case is that of their main office. All of these publishers are anxious to answer your requests for information regarding their publications—*write them.*

American Book Co.
360 N. Michigan Ave.
Chicago, Ill.

American Technical Society.
Drexel Ave. at 58th.
Chicago, Ill.

Thos. Y. Crowell Co.
432 Fourth Ave.
New York, N. Y.

Ginn & Company
Statler Bldg.
Boston, Mass.

Harper & Brothers
49 E. 33rd St.
New York, N. Y.

D. C. Heath & Co.
285 Columbus Ave.
Boston, Mass.

Norman W. Henley Publishing Co.
2 W. 45th St.
New York, N. Y.

Henry Holt & Co.
257 Fourth Ave.
New York, N. Y.

Houghton Mifflin Co.
2 Park Ave.
Boston, Mass.

International Textbook Company
Scranton, Pa.

The Macmillan Co.
60 Fifth Ave.
New York, N. Y.

The Manual Arts Press
Peoria, Ill.

McCormick-Mathers Publishing Co.
Wichita, Kansas

McGraw-Hill Book Co.
330 W. 42nd St.
New York, N. Y.

McKnight & McKnight
Bloomington, Ill.

National Audio-Visual Council, Inc.
160 N. LaSalle St.
Chicago, Ill.

Noble & Noble
100 Fifth Ave.
New York, N. Y.

Prentice-Hall, Inc.
70 Fifth Ave.
New York, N. Y.

Radio & Technical Publishing Co.
45 Astor Pl.
New York, N. Y.

John F. Rider Publisher, Inc.
404 Fourth Ave.
New York, N. Y.

The Ronald Press Co.
15 E. 26th St.
New York, N. Y.

Scott, Foresman & Co.
623 S. Wabash Ave.
Chicago, Ill.

Charles Scribners Sons
597 Fifth Ave.
New York, N. Y.

Silver Burdett Co.
45 E. 17th St.
New York, N. Y.

Thordarson Electric Mfg. Co.
500 W. Huron St.
Chicago, Ill.

Universal Scientific Co.
Vincennes, Ind.

D. Van Nostrand Co.
250 Fourth Ave.
New York, N. Y.

Webster Publishing Co.
1808 Washington Ave.
St. Louis, Mo.

John Wiley & Sons, Inc.
440 Fourth Ave.
New York, N. Y.

John C. Winston Co.
1006 Arch St.
Philadelphia, Pa.

World Book Co.
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PRE-SERVICE COURSE IN ELECTRICITY
William C. Shea $1.52

PRE-SERVICE COURSE IN AUTOMOTIVE MECHANICS
James V. Frost $1.96

PRE-SERVICE COURSE IN MACHINE SCIENCE
Samuel Lebowitz (Ready in March)

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FUNDAMENTALS OF ELECTRICITY

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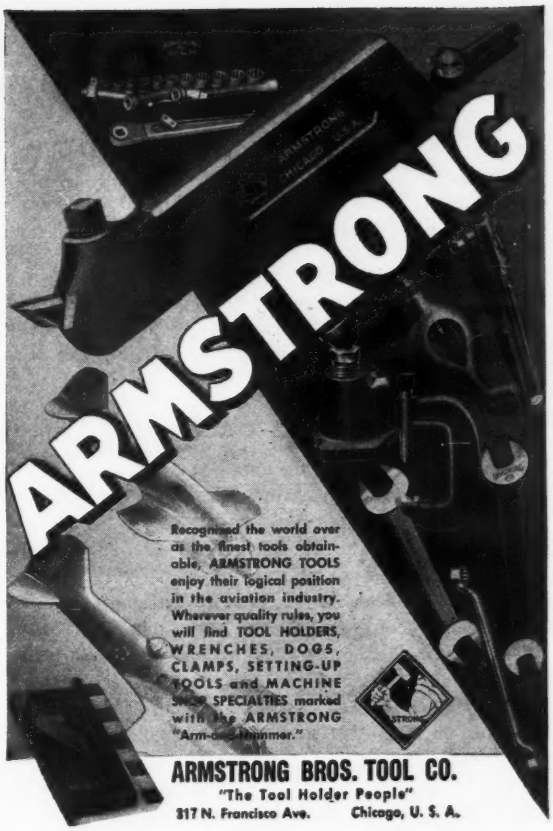
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The Manual Arts Press Peoria Illinois

Student Pilots....

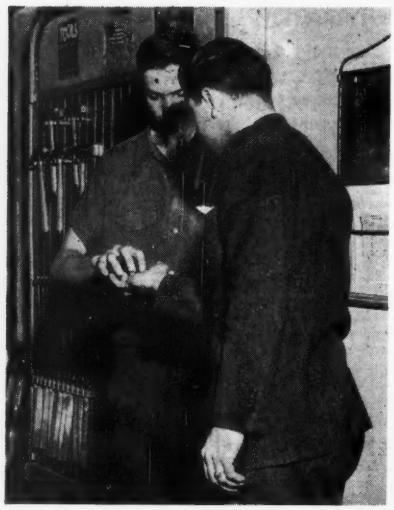
(Continued from page 4)

Procedure.—(1) Have the student stand with his arms limp at his sides. (2) The instructor lifts the student's left arm and holds it in the air for a few seconds and then lets go of it without warning. (3) Repeat three times for each arm and record whether the student lets his arm fall limply to his side.

Requirements.—Passing one out of six trials is considered satisfactory. Scoring for all classifications is simply passed or failed.

Muscular Tremors.—The test for muscular tremors (the jitters) measures more or less one's ability to control himself in an emergency. Freezing the controls of a plane by a frightened student pilot is an example of "jitteryness."

Procedure.—(1) Ask the student to close both eyelids tightly and note any

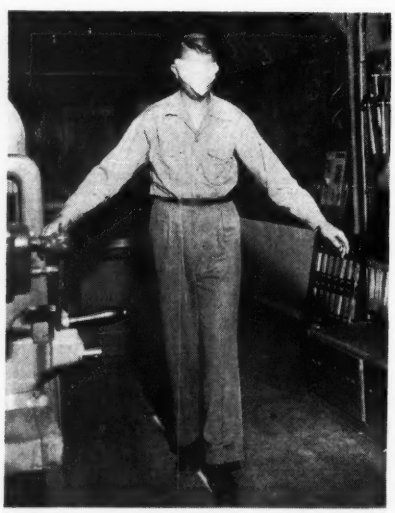


tremor of the eyelids. (2) The instructor should extend his own hand with the fingers turned upwards to the student. (3) The student then places his four fingers lightly on those of the instructor. Observe any tremor or nervousness in the student's finger tips. (4) Ask the student to pick up a full glass of water and take a sip out of it. Note any tendency to tremor. (5) Ask the student to stick out his tongue. Notice any tendency for the tongue to tremble.

Requirements.—The student should score steady on one of the four tests to pass.

Gait.—This test records the student's ability to walk a straight line.

Procedure.—(1) The student stands at one end of the line and at the com-

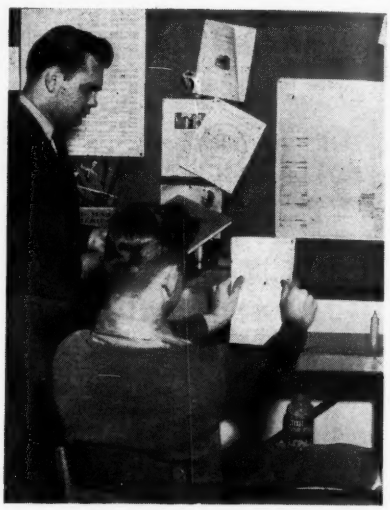


mand of the instructor walks to the end of the line, then turns around and returns to the starting point. (2) Blindfold the student and stand him at the end of the line. Command him to walk along the straight line until told to stop. When the student has taken a few steps, tell him to stop, turn around, and walk back.

Requirements.—Record the student's performance as either steady or unsteady.

Ocular Muscle Balance.—This tests eye coordination.

Equipment.—A piece of cardboard with a ½" hole through it; a red piece of cellophane or glass; one large candle.



Procedure.—(1) Place a lighted candle on a table 20 feet from the student. (2) Have the student hold the piece of cardboard with the ½" hole in front of him so that he can see the candle flame through the hole with both eyes open. (3) Without moving, the student should alternate closing one eye and then the other. When the stronger eye, sometimes called the sighting eye, is closed, the flame cannot be seen by the other eye. (4) the instructor then holds the red piece of glass or cellophane over the "nonsighting" eye, so that the student sees the flame through the red shield.

Requirements.—If the student sees one white and one red flame, his muscular balance is off and he must be recorded as failing.

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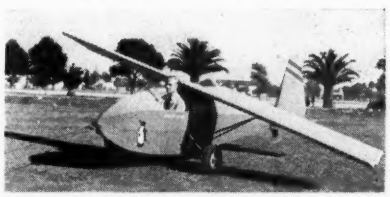
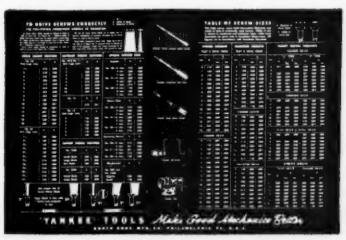
A trainer for use in pre-flight instruction is offered in blueprint form to shop teachers by California Aero Glider Co. The Pre-Flight Trainer, illustrated below, enables students to learn coordination of flight controls without actually leaving the ground. The trainer is towed on the ground, at from 8 to 15 miles per hour, and is perfectly safe.



In shop work, the glider calls for the following technics: gluing, nailing, jig building, sawing, assembling, brazing, machining, fabric covering, painting, sheet-metal layout, etc. Relatively little critical material is used. For further information, address SCHOOL SHOP or California Aero Glider Co., 1829 W. 62nd St., Los Angeles, Calif.

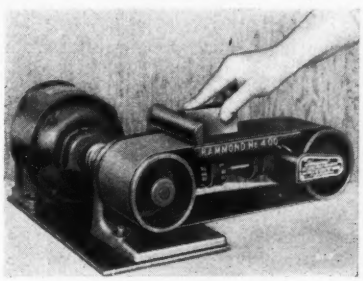
North Bros. Publish Chart on Screw Drivers

A chart containing instructional information on screws and screwdriving has been offered to teachers by North Bros. Mfg. Co., Philadelphia. The chart, 11 x 17 inches in size, contains tables showing width and thickness of the top of screwdrivers made by the company, together with illustrations pointing out right and wrong ways of driving screws. Another table shows the head, slot, and other dimensions of all types of wood, machine, and sheetmetal screws, and stove bolts. Copies may be had without charge from SCHOOL SHOP or North Bros. Mfg. Co.



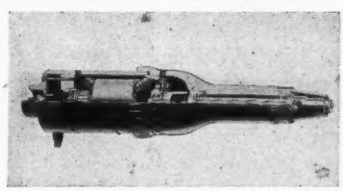
Hammond Introduces New Belt Surfacer

The Hammond "400," a new bench-type belt surfacer for wet or dry buffing, burring, surfacing, or polishing is now being manufactured by Hammond Machinery Builders, 1687 Douglas Ave., Kalamazoo, Mich.



Plastics, steel, ceramics, hard rubber, stone, lead, aluminum, wood, and other materials may be finished on the "400." With the proper abrasive belt the machine will perform such work as removing sprues and flash from rough castings. With a finer belt, a fine luster may be developed on glass, pottery, plastics, etc.

The belt, of the 4" x 35" endless type, runs over balanced ball-bearing pulleys. The surfacer operates in any position between vertical and horizontal. Teachers may obtain more information by writing for bulletin GP-2, either to SCHOOL SHOP or the manufacturer.



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from WASHINGTON by WILLIAM PACA

FOR the first time in a generation all those who normally seek and want jobs are at work—fighting or producing. But still the Great God Mars is not satisfied. He wants about 6.4 million more people in 1943 who are not normally employed. These extra workers are needed to bring the United States to the peak of its striking power. Where are they to come from? Some will come from among housewives, retired or handicapped, certainly; but also from that great reservoir —the pupilpower in the high schools.

That is why Director L. S. Hawkins of Vocational Training for War Workers sent out an SOS to state directors asking them to enroll in war-training classes high-school seniors and other students who will not return to school the following semester.

Many local communities have been way ahead of Director Hawkins in this respect. School after school is already sending boys and girls in their final semester to training classes for war industry. These special classes are held partly on school time and partly on the student's free time. Frequently they are held on Saturday. And in some communities, students attending war production vocational classes are given credit toward graduation.

● Director Hawkins' action is only one of a series of steps manpower and training officials are taking to attract people into the laboring force. Up to now, the millions of unemployed have provided a ready reservoir for trainees. Today that reservoir is dried up. Trainees are not available.

This would seem to hold gloomy prospects for the training programs. Your reporter therefore asked a War Manpower Commission official: "How many people do you believe will be available for training in 1943?"

His answer was astonishing, until he explained it:

"About 15,000,000 to 16,000,000."

"How is that possible, when it's already difficult to recruit trainees?" your reporter asked.

"Now that nearly every person who can hold a job is at work," he answered, "our principal concern must be not the people who are outside the labor force, and who must be recruited, then trained and placed. Our main worry now is how to utilize the people who are already at work. We must make certain that all workers do better what they are expected to do anyway. Therefore, all workers on war jobs may be expected in 1943 to improve their skills, either through on-the-job training or in schools."

● This statement foreshadows the interest of Washington officials in a so-called utilization policy of manpower. In practice, this may take the form of a war-factory inspection plan. Federal inspectors, among other things, would recommend to individual employers how many employed workers could improve their skills through vocational education courses or in-plant training.

● Favorite exercise of Congressmen and Senators is to toss into the legislative hopper bills which may or may not have a chance for passage. At least 22 bills, which may be of interest to SCHOOL SHOP readers, have already been introduced by the new Congress.

Among them is the new federal-aid-to-education bill, now called "keep-the-schools-open" bill (S. 637). It would authorize 300 million dollars, in part to raise substandard teacher salaries. Would vocational school teachers be likely to share in this money? Some may, ventured one Washington educator, although most of the salary increases would go to rural and other under-paid teachers, *if* this bill ever passes.

Among other measures introduced are bills proposing:

—Training of air-traffic control-tower operators;

—Setting up a division of aviation education in the Office of Education;

—Providing vocational rehabilitation for disabled members of armed forces and for civilian defense workers injured in line of duty (OCD says there are now 10,000,000 air-raid wardens and aircraft spotters, all of whom would be eligible).

—Providing vocational rehabilitation for persons disabled in normal employment;

—Abolishing the NYA.

● Scrapping the NYA is also among the 15 recommendations made by the Committee of the American Association of School Administrators and the U. S. Chamber of Commerce. Turn over the equipment used by the NYA, says the Committee, to local and state school authorities. It then goes on to more basic recommendations. Your reporter obtained a composite of reactions to these suggestions from federal officials (printed in italics).

The Committee urges war industries to employ workers in advance, then send them to training agencies for preemployment training. (*Good practice, says Washington.*) It urges setting up area vocational schools, patterned after consolidated high schools. (*Cannot be done until after the war, because building materials and transportation facilities are scarce.*) It asks for greater use of women and handicapped persons. (*O. K., but how about training more Negroes and other minority groups, not mentioned in the recommendations?*)

Finally, the Committee asks continued use of the U. S. Employment Service as the "inducting" center for all trainees. (*That's the right procedure; but the Committee says nothing about the need to strengthen the quality of personnel who run the employment offices. Low salaries are forcing many employment office managers and interviewers to quit. In some USES offices one-third of all positions are vacant; in others only the lower quality people remain.*)

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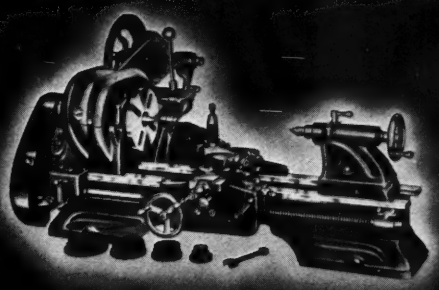

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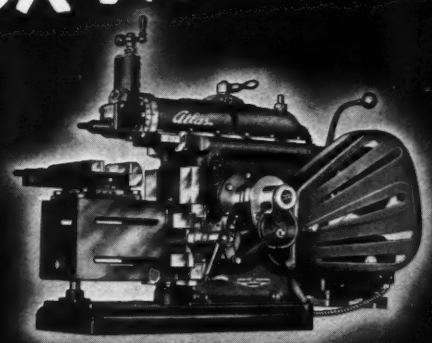

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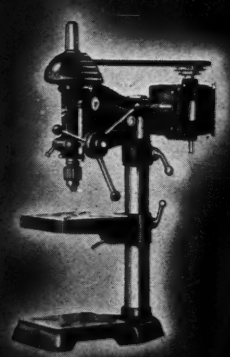

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